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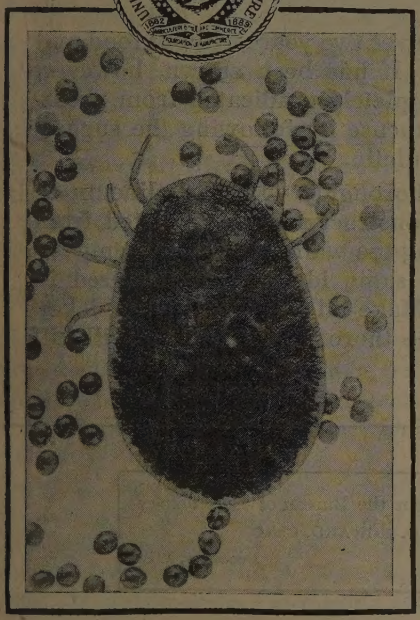
The Fowl Tick



and how premises may be freed from it.

THE chicken tick, fowl tick, or "blue bug" is a serious pest of poultry in parts of the Southwestern States. Chickens are often killed by it and no flock can thrive properly where ticks are present in any numbers. The great majority of the ticks are to be found in cracks about the chicken house. A tick in the first or seed-tick stage, however, attaches itself to the fowl and will remain there sucking blood for from three to ten days. The older ticks feed only at night.

The ticks may live over two years without food and are difficult to kill. It has been shown, however, that they can be completely eradicated from premises without great expense by following the suggestions given in this bulletin.

Spray the house thoroughly with carbolineum or crude petroleum. Construct roosts supported from the floor, not touching the walls, and easily removed for treatment. The same idea should be used in building the nests. Make all fowls roost in chicken houses. One to three thorough treatments will kill all the ticks.

Contribution from the Bureau of Entomology
L. O. HOWARD, Chief
Washington, D. C. December, 1919

THE FOWL TICK AND HOW PREMISES MAY BE FREED FROM IT.[1]

F. C. BISHOPP,

Entomologist, Investigations of Insects Affecting the Health of Animals.

CONTENTS.

	Page.		Page.
Present distribution in the United States	3	Combative measures—Continued. Roost and nest construction	11
Hosts	4	Cost of treatment	13
Effect of attack	5	Methods of preventing tick infestation	14
The life and habits of the tick	5	Tick-proof houses	15
Combative measures	9	Effect of treatment on other fowl pests	15
How to treat infested houses	10	Useless remedies	16
Number of treatments necessary	11		

ONE of the most serious handicaps to successful poultry raising in the Southwest is the insidious attack of the chicken tick, fowl tick, or so-called "blue bug." In the infested region it is not uncommon for people to dispose of their chickens because of the ravages caused by this pest, and those who retain flocks often do so at considerable financial loss. While a few commercial poultrymen are said to have retired from the business on account of the chicken tick, on the whole these poultrymen, by keeping up a constant fight against the pest, do not feel such heavy losses as do the innumerable owners of small flocks on farms and in towns and cities.

PRESENT DISTRIBUTION IN THE UNITED STATES.

No attempt has been made to determine just when or from what source the tick entered this country, but it appears certain that it has been present a good many years and is gradually spreading over new territory and becoming more widely disseminated in the old infested areas.

Roughly, the present distribution of the tick in the United States may be said to extend throughout the western three-fifths of Texas, from approximately the longitude of Dallas westward; the southern third of New Mexico and Arizona; southwestern Oklahoma; three-fourths of southwestern California; and portions of Florida. During the last six years it appears that the pest has extended its range northward in the Sacramento Valley of California a considerable distance, as Mr. R. W. Wells has found it to be firmly established in Shasta County. It has also become rather generally

[1] Known scientifically as *Argas miniatus* Koch. The name *Argas persicus* is applied to this species by some authors.

present in Dallas, Tex., and vicinity, and a rather heavy infestation was found in Galveston, Tex., by Mr. O. G. Babcock. An unconfirmed report of its occurrence in southern Louisiana has been given us by Prof. A. F. Rolf. The status of the distribution of the tick in Florida is not accurately determined. It has been found in poultry houses at Key West, Fort Lauderdale, Miami, and Palm Beach. It also has been reported to occur in the vicinity of Tampa and Tallahassee.

Reference to the accompanying map (fig. 1) will give a clearer idea of the area infested. It will be noted that the tick thrives where the rainfall is comparatively light—30 inches or less per year. It also appears that the humidity of the atmosphere has much to do with its breeding. The tick has undoubtedly been shipped with fowls into many parts of the United States, and specimens have been taken in States as far removed from the normally infested areas as Iowa. It has not established itself, however, in the more humid and cooler parts of the country. There is reason to believe that although it may be established and develop for a short time, infestations in such regions probably will die out. This is true also of the higher mountain regions.

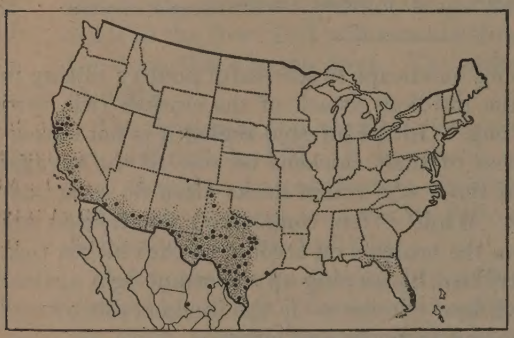


FIG. 1.—Distribution of the fowl tick in the United States. The large dots indicate where the tick has been collected by the Bureau of Entomology and the small dots show where the tick occurs more or less commonly.

HOSTS.

The chicken appears to be the preferred host of the fowl tick and suffers most heavily from its attack, although turkeys, geese, ducks, pigeons, ostriches, and guineas are all subject to attack. In the United States the turkey is the most seriously injured of these latter. In some parts of the world, notably Persia, this tick is accredited with causing serious symptoms by biting man. In this country there are no authentic records of this habit, although ticks can be induced to bite man experimentally. In such cases the bite appears to produce no marked symptoms. The tick has been induced to bite rabbits, rats, and mice in experimental cages, but in nature rodents and other mammals are apparently free from attack. A few reports have

been received of annoyance caused by the tick where horses and cattle have been kept in barns where infested chickens roost, but such attacks on live stock must be of little economic importance. Certain wild birds have been found to harbor limited numbers of these ticks. Among these are wild turkeys and quail. Such infestations no doubt often come from close association of the birds with infested poultry or chicken yards.

EFFECT OF ATTACK.

The presence of fowl ticks in poultry houses often is not known to the owner until the fowls show marked symptoms of injury, such as weakness in the limbs, extreme poverty, or paleness about the head. If chickens in such conditions are not removed promptly from the source of infestation, or the poultry house treated, they often die in considerable numbers or are so weakened in vitality that they are rendered easy prey for various types of disease. Another and probably the main source of loss is through the reduction in egg production. Fowls in heavily infested houses have been known not to lay an egg for months, and even under the very best conditions as regards feeding and breeds the egg output is greatly reduced. Fowls raised where ticks have more or less access to them are often stunted in growth. Another source of loss is through the desertion of the nests by sitting hens, caused by annoyance from the ticks.

Death is brought about by heavy infestation, which drains the fowl of blood. This is possibly supplemented by poisonous secretions introduced by the ticks. Death loss is most common in cases where fowls are placed in infested chicken coops which have not been used for several months. In such instances the ticks are extremely hungry and swarm over the fowls by the thousands. The symptoms are usually weakness in the legs and droopiness of the wings, the chickens being unable to walk or get on the roost. The feathers appear ruffled, and there is usually a loss of appetite, and sometimes diarrhea. The comb may or may not appear pale. Sometimes death is produced in a day or two. Chickens, soon after hatching, are often killed by becoming infested with ticks.

THE LIFE AND HABITS OF THE TICK.

Many of those who are quite familiar with the pest do not know that the small dark colored objects attached to the skin of the fowl (see fig. 2) are a stage in the life of the chicken tick, the later stages of which are found almost exclusively in the cracks about the henhouse. In fact there are many times more ticks present about the henhouse than on the chickens. The chicken tick is very similar in its habits to the bedbug except in the first or seed-tick stage. Ordi-

narily it is much easier to determine the presence of the pest by examining the ends of the roost poles, or pulling up loose pieces of bark or boards about the roosts, than by examining the fowls themselves. One can usually detect the presence of the tick by looking

FIG. 2.—The fowl tick: Mass of seed ticks, more or less filled with blood, attached to skin of chicken. About natural size.

for spots of black excrement on the wood near the cracks where the ticks are hiding.

As the foregoing statements indicate, the life of this tick is quite different from that of the ordinary cattle tick or so-called wood ticks,

this form having modified its habits to fit in very nicely with the habits of the host.

The eggs are nearly spherical, brownish in color, and are deposited in the cracks about the henhouse. The female tick, surrounded by eggs, is shown on the title page. During warm weather the eggs hatch in from 10 to 15 days, and in cool weather the hatching period may exceed 3 months. The young ticks (fig. 3) which hatch from these have six legs and are grayish in color, thus being quite different in appearance from those seen on the fowls or the older ticks about the roost. They crawl rather rapidly and sometimes are seen moving about over the roost in the daytime, especially if the weather is cloudy. Ordinarily, however, they only emerge at night and go about in search of a fowl. They crawl up the legs and attach themselves on various parts of the body, especially where the feathers are not very dense. The ticks attach themselves in bunches on a host and usually they are most readily seen on the breast, under the wings, and on the thighs and neck. They attach themselves very firmly by their spiny mouth-parts and begin sucking blood. In a day's time they become somewhat enlarged, and reddish or bluish in color. They are completely engorged with blood in from a little over 3 days to about 10 days, and as soon as full-fed they let go of the host during the night and crawl along the roosts in search of suitable hiding places. If good protection is not at hand they sometimes crowd together in dense masses. In this stage the seed tick is about one-tenth of an inch long and usually dark blue or purplish in color.

FIG. 3.—The fowl tick: Underside of the first or seed-tick stage before feeding. Greatly enlarged.

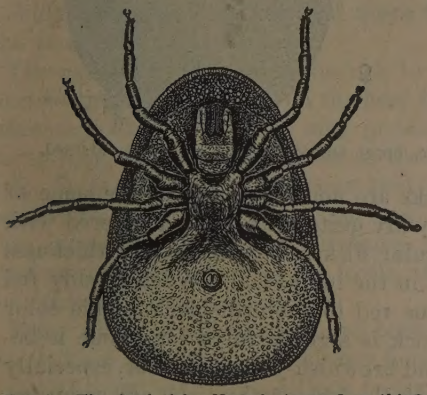


FIG. 4.—The fowl tick: Nymph (second or third stage) as seen from beneath. Greatly enlarged.

In from four to nine days after leaving the host the seed ticks shed their skins and gain an additional pair of legs. They also increase in size. In this stage and all subsequent stages the tick feeds

at night only, and the meal of blood is taken very rapidly, so that long before daylight comes those ticks which have been successful in finding a host have become filled with blood and are hidden away in some crevice. Following each of the first three meals of blood the skin is shed, and at the time of the last molt the adult males and females appear. The adults vary from about one-fifth to nearly one-half inch in length. After partaking of another meal of blood the females are ready for laying eggs. While most ticks lay only one batch of eggs, after which the female dies, this species may deposit as many as eight lots of eggs, each being followed by an engorgement with blood. About 500 to 900 eggs are deposited by each female.

FIG. 5.—The fowl tick: Adult female, upper and lower sides. Greatly enlarged.

While the bodies of these ticks are not very hard, as are some of the so-called "wood ticks," they are quite leathery and covered with minute granulations and irregular disks. The color and thickness vary with the amount of blood in the individual. When freshly fed they range in color from a wine red to a bluish black. This color gradually fades, and when a tick is starved for a long time it becomes almost as thin as paper and brownish-yellow in color, especially around the edges. Even when full of blood the ticks are comparatively flat and thus well adapted to hiding in cracks. The sucking mouthparts are located between the front legs, as is shown in the accompanying figures. For this reason they can not be seen from above as in most ticks.

The length of time the fowl tick can survive without food is truly remarkable. Adults have been known to live over 2 years when

confined in tight boxes without any food. In some of the tests the ticks survived nearly 2½ years, and there is little doubt that in infested chicken houses some of them may survive considerably longer than this, even when all poultry is excluded. The younger stages show slightly less longevity. The seed ticks usually die if they do not find a host in about 5 or 6 months, but the nymphal stages may live for from 8 to 15 months. From these statements it will be seen that the starvation of the tick by the closing up of a henhouse and excluding the fowls is a difficult matter, and the injury produced by ticks to fowls introduced into houses which have been vacant for a year or so is explained.

The rapidity of breeding, as has been suggested, depends upon the temperature. Hot, dry weather does not interfere with the development of the chicken tick; in fact it appears to be at home under such conditions. In the Southern States some breeding may take place even in midwinter, but all of the stages are greatly lengthened. For this reason the injury to poultry is usually more apparent in the spring months, when the ticks begin to assume activity after their winter resting period.

COMBATIVE MEASURES.

The fowl tick is much more difficult to destroy with various chemicals than most known insects and ticks. This natural resistance to destructive agents is also greatly increased by the fact that the pest is able on account of its flattened shape to crawl into deep cracks and thus largely escape treatment.

The natural resistance of the tick to chemicals, and the fact that the seed-tick stage remains on the host for a few days only, while the infestation about the roosts may persist for years, naturally causes one to turn to the poultry house as the most vulnerable point of attack. In fact, investigations show that it is inadvisable to apply any material to the fowl in an attempt to kill the young ticks attached to them, since practically any substance sufficiently strong to kill the ticks would cause injury to the fowls, and the ticks would soon leave the chicken of their own accord.

Many different substances have been tried with more or less success against fowl ticks in chicken houses. It is apparent that the material must have high killing power and also considerable penetration in order to reach the ticks in their places of hiding. Lasting power is also another important quality. These requirements are met satisfactorily by crude petroleum and the wood preservative known as carbolineum. Carbolineum is more destructive to the ticks than is petroleum, persists longer, and has the advantage of drying into the wood so as not to soil the fowls. In some sections, however,

it is less readily obtained and is usually higher in price. In tests carried out by Mr. H. P. Wood it was found that unsprayed ticks, placed on boards that had been treated even weeks before with carbolineum, failed to deposit eggs and gradually died off. Many seed ticks were driven out of the cracks and these died in a short time on the sprayed surfaces of the boards. These same effects on ticks were exhibited in henhouses sprayed and maintained under farm conditions. Anthracene oil, which is the principal constituent of carbolineum, has been found to be about as effective as carbolineum in tick destruction. It may be used in the same way as carbolineum, but, although slightly cheaper, it can not be obtained generally on the market. Creosote oil containing 8 to 20 per cent tar acids is also very destructive to "blue bugs" but is difficult to use in a spray owing to its caustic effect on the operator. When applied to the roosts and cracks with a brush it destroys all ticks touched and persists well.

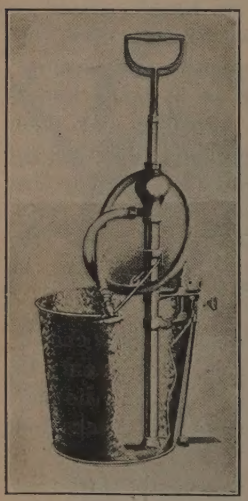


FIG. 6.—A type of bucket pump suitable for spraying chicken houses and useful for other spraying purposes. (Quaintance and Siegler.)

HOW TO TREAT INFESTED HOUSES.

Begin in the morning by removing all unnecessary material from the henhouse, including nests, roosts, superfluous boards, etc. If these are of no great value it is usually advisable to remove them carefully and place them on a bonfire. If it is desired to keep the boxes they should be placed in a pile ready for spraying. When either crude petroleum or carbolineum is used it is generally necessary to spray the entire inside of the chicken house. For this purpose it is best to use a good bucket pump (fig. 6) with a 10 or 12 foot lead of hose and a good nozzle. It will be found that either the carbolineum or crude petroleum will spray better and go farther if thinned with about one part kerosene to two parts carbolineum or crude oil. The spray should be driven directly into every crack, and the roof well covered as well as the walls. Ordinarily it is also necessary to spray the floor, as some ticks are dropped in removing the roosts, etc. On heavily infested premises it is usual to find every small coop and brooder infested as well as the large chicken house, and if such is the case they should either be burned or be thoroughly sprayed.

In using carbolineum or anthracene oil in treating a poultry house which is closely built, it is advisable to keep the fowls out the night

following the treatment in order to allow the material to dry in thoroughly, as the fumes from it are inclined to irritate the eyes and mucous membranes of the chickens. This precaution is not necessary in the usual open-front or loosely built chicken house, such as is found in most of the Southwestern region. After spraying with crude oil it is usually advisable an hour or two after spraying to wipe the free oil off the roost poles and other parts of the building where it may have accumulated and be in danger of dripping on the chickens.

On many farms in the Southwest poultry roost to some extent in the trees, and the ticks are to be found in great numbers under loose bark and in crevices in the trunks. Barns heavily infested with ticks are not uncommon. It is obvious that ordinarily trees and barns can not be sprayed effectively and these conditions must be met by making the chickens roost in the henhouse after it has been treated.

NUMBER OF TREATMENTS NECESSARY.

The number of treatments necessary is dependent largely upon the construction of the building, the number of infested places on the premises, and the thoroughness of the work. Following careful spraying, it is of paramount importance to build roosts and nests of the type described below, in order to destroy the infestation. If the chicken house can be sprayed thoroughly, usually one general treatment is sufficient with either of the materials mentioned. The crude oil is less persistent than the carbolineum, and unless nearly all of the ticks are reached, it is sometimes necessary to give a second or even third general spraying when the crude oil is used. In any event it is important to keep a watch on the roosts, and usually advisable when carbolineum is used to treat them once with a brush about 30 days after the general spraying, and give two or three treatments in the same way at 20 or 30 day intervals if crude oil is employed. Owing to the great longevity of the ticks and the possibility of some of them being picked up by chickens roosting or laying away from the regular place, it is always advisable to keep watch for a year or two on the roosts and nests, and as soon as any ticks are observed to give the roosts and nests a treatment with a brush.

ROOST AND NEST CONSTRUCTION.

After the spraying has been completed it is of vital importance to have roosts and nests properly constructed. In some localities roosts suspended by wires from the ceiling of the henhouse have become quite generally used. While such roosts aid in preventing very

heavy infestations, they are constructed in such a way as to make the destruction of ticks on them difficult, and some breeding usually takes place on the roosts themselves.

Since the natural tendency of the tick in all stages is to crawl upward, and not on the ground, it has been found that *a roost supported from the floor of the house and kept entirely free from the walls is by far the most satisfactory. It is also essential to have the roost fitted together in such a way that it can be examined or knocked down with greatest possible ease.* The accompanying illustration (fig. 7) shows a roost of this type. It consists essentially of four supporting posts either set in a concrete floor, sustained on a wooden floor by brackets, or driven into the ground in the case of a dirt floor. These four posts are made of two by fours or two by sixes according to the size of roost needed. The tops are notched to receive crosspieces of similar material. These crosspieces are in turn notched at intervals of about 14 inches to receive the roosting poles. The ends of the roosts and crosspieces should not extend near enough to the walls of the house to permit fowls roosting on them to touch the walls. The entire roost construction should be made of good lumber free from loose bark and with very few cracks, knots, etc. After constructing the roost it should be sprayed or given a good coat with a brush of the material used in spraying the chicken house.

FIG. 7.—A type of roost designed to combat ticks. Carbolineum or crude oil is easily applied with a brush or spray.

The construction of nests so that they can be cleaned and treated with ease is nearly as important as having roosts so built. This is especially true during the hatching season. For small flocks it is possible to utilize boxes for nests and to burn them as soon as they become infested. It is preferable, however, to construct nests incorporating the ideas used in the accompanying illustrations (figs. 8 and 9). Such nests may be placed on the inside of the chicken house or constructed independently of the house. The essential features are to avoid complicated construction and to facilitate prompt and complete removal and treatment. The series of nests illustrated consist essentially of a bottom board resting on a stand or placed loose on iron brackets screwed to the wall. Upon this are set without attachment the nest partitions. These partitions are held together

by a board 4 inches wide nailed along the front edge at the bottom to retain the nest material and another on the top at the front edge. The wall of the house forms the back of the series of nests or another board can be hooked to the partitions for this purpose. A piece of galvanized iron is fastened lightly to the wall with nails or wire to form a covering. This prevents chickens from roosting on the nests and gives some seclusion to the laying hens. For treatment the cover can be removed or fastened up, the nest partitions lifted off, the nest material burned, the bottom board removed, and the entire structure easily oiled with a spray pump or brush.

COST OF TREATMENT.

The expense involved in cleaning up a tick infestation is not prohibitive. A bucket pump really should be found on every farm or town lot where poultry and fruit trees are raised. Carbolineum costs from $1 to $1.50 per gallon, and crude petroleum from 5 to 50 cents per gallon, according to the distance from supply. The amount needed to treat a building varies, of course, with the character of construction and size of the building. A chicken house 12 feet square of the frame type, which is usually found in the Southwest, would require about 4 gallons of carbolineum or 5 gallons of crude oil when thinned with kerosene at the rate of 2 gallons with carbolineum or 1 gallon with crude petroleum. This would make the cost of one treatment with carbolineum about $4.50, and where large supplies of crude petroleum are at hand spraying with it would cost about 70 cents. When it is considered, however, that more applications are needed in order to accomplish the desired result with crude petroleum, the difference in actual expense of destroying the infestation is very little. The expense for the material used for subsequent treatments of the roost and nests is much less, owing to the small amount of material needed.

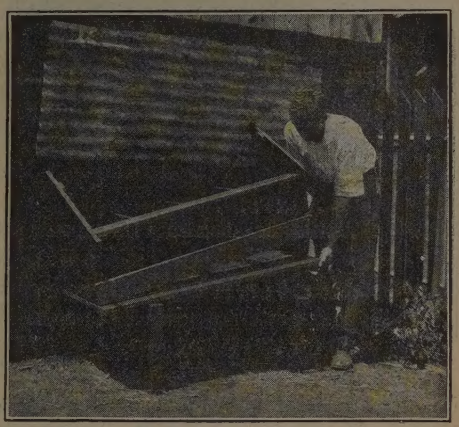


FIG. 8.—Type of nest readily built, and easily cleaned and treated for chicken ticks or mites.

The cost of the material for the removable roosts and nests as described amounts to but a few dollars for the usual farm flock, and the labor of installation is surprisingly small. The convenience and

saving of time in cleaning out a chicken house with this equipment will soon pay for the cost of installation, to say nothing of the results accomplished in tick control.

METHODS OF PREVENTING TICK INFESTATION.

It is much easier to exclude fowl ticks from clean premises than to destroy them after they are once established. For this reason those who contemplate beginning chicken raising should employ every means of maintaining tick-free premises. For the commercial poultry raiser it is advisable to choose a site well apart from other premises where chickens are raised, and in constructing a poultry house and arranging other equipment the question of controlling the fowl tick and other poultry pests should be kept constantly in mind. For such a beginner it is advisable to start with chickens hatched from incubators on the premises or to secure day-old chicks from hatcheries known to be free from ticks. Should it be deemed advisable to bring chickens onto a place at any time, they should be placed in temporary coops in small yards for 10 days. During this quarantine period the seed ticks, should there be any on the fowls, will have become engorged and left them. The chickens then may be treated with sodium fluorid for lice[1] and liberated. The quarantine coops should then be burned or sprayed with carbolineum or crude oil as outlined above. The same procedure should be followed in moving fowls from an old, infested coop into a clean one.

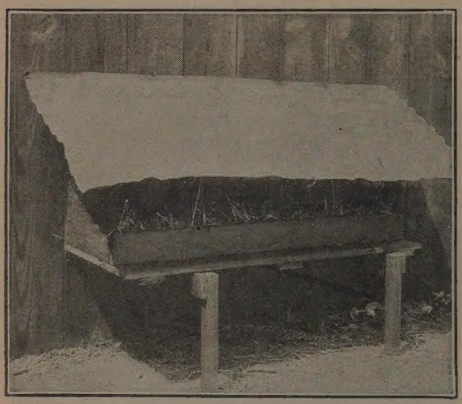


FIG. 9.—Nest treated and ready for use.

TICK-PROOF HOUSES.

Some suggestions have already been made regarding poultry-house construction. It is apparent that if one keeps in mind, during planning and building, the insect pests with which one has to deal, future trouble and expense may be avoided and buildings which may be termed tick-proof produced at an outlay not greatly exceeding that necessary to build a house which would favor tick and mite development.

The all-metal chicken house probably approaches nearest to the tick-proof ideal. While this has the disadvantage of somewhat

[1] The destruction of lice is discussed in Farmers' Bulletin 801, which may be obtained free upon request.

greater cost of construction and is also excessively hot during the summer, necessitating the provision of ample shade outside of the building, it is not ill adapted to conditions in the Southwest. With metal houses it is very important to provide hinged panels on all sides of the building to be opened in hot weather. If roosts and nests of a type similar to those described are built, ticks can be absolutely excluded from such buildings, since the frames are made either of angle iron or piping and offer no suitable hiding places for the pest. Should a few become established the excessive heat during the summer is sufficient to control them. A number of corrugated iron houses with wooden frames are now in use in tick-infested regions and are proving very satisfactory. Some of these are constructed with a wooden frame on the outside, thus reducing the chances for tick multiplication, or the common practice may be followed of burning a quantity of paper or straw in the house. The heat thus generated may be made sufficient to destroy all insect life in the building.

The many advantages of the reinforced concrete house need not be mentioned here, but one of them is the ease with which the fowl tick and poultry mite may be controlled.

EFFECT OF TREATMENT ON OTHER FOWL PESTS.

The methods of constructing and spraying roosts and nests as outlined will accomplish complete destruction of the common chicken mite[1] should it be present. In fact this method is the best means of destroying the chicken mite, but as this pest is more easily killed than the tick the number of treatments usually may be lessened. All of the spraying materials mentioned are effective in destroying mature fleas such as the sticktight and bird flea, but this treatment of itself can not be relied upon to clean out a flea infestation.[2] Complete painting of the roosts in the way suggested aids in reducing troubles from the scaly-leg mite, but will not eradicate it.

Carbolineum is claimed by some to be effective in controlling chicken lice, but since lice remain on the fowls constantly and do not get upon the roosts, the spraying of a building will not accomplish their destruction.

USELESS REMEDIES.

During recent years a number of proprietary compounds have been put on the market which have been exploited as "sure death" to "blue bugs." In general these fall into two classes—those to be applied to the poultry house and those to be placed upon the fowls or

[1] For more complete information regarding the control of the chicken mite, scaly-leg mite, and chicken lice, reference should be made to Farmers' Bulletin 801.

[2] The control of fleas is discussed in Farmers' Bulletin 897.

given to them internally with feed. Some of those in the first class may be fairly satisfactory for tick destruction, but are usually more expensive than the remedies recommended in this bulletin. Those in the second class are worse than useless, in that none of them will destroy tick infestations and some of them are actually harmful to the fowls. It is preposterous to suggest that any material sufficiently strong to kill a tick as tenacious of life as is this form would not kill fowls, when fed to them, before accomplishing the eradication of the ticks. It should be remembered that the ticks may be hidden away in the cracks and may not visit the fowls for months or even years. In nearly every case such remedies are prepared and sold by men who are not familiar with the essential facts regarding the life history and habits of the tick, and too often by those who are ready to take advantage of poultry raisers seeking relief from the ravages of the pest.

A number of the lighter oils, such as kerosene and gasoline, have been used against this pest. They are unsatisfactory, since they do not persist long enough to kill many of the ticks.

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